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ABSTRACT

This study reports on the development and validation of a questionnaire to assess student perceptions of the teacher-student interaction in Taiwan and Australia. The questionnaire is part of a cross-national study of science classroom environments in Taiwan and Australia. The questionnaire contains five domains: (1) higher-order questioning behavior; (2) encouragement and praise behavior; (3) non-verbal supportive behavior; (4) understanding and friendly behavior; and (5) strict behavior. The development process included the translation of the Chinese version into English, the back translation of the English version into Chinese again by people not involved in the original translation, and subsequent changes to wording where necessary. Following the translation, a pilot study was conducted in both countries which included interviews with students about their comprehension and interpretation of individual items in the questionnaire. Refinements were made to the questionnaire based on statistical analyses the interviews. Administration of the questionnaire to a total of 100 grade 7-9 science classes (N=2,397) from both Taiwan and Australia supported each scale's internal consistency, reliability, and validity. Contains 11 references. (Author/JRH)

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THE DEVELOPMENT AND VALIDATION OF A QUESTIONNAIRE FOR
ASSESSING STUDENT PERCEPTIONS OF TEACHER-STUDENT
INTERACTION IN TAIWAN AND AUSTRALIA

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ABSTRACT

This paper reports part of a cross-national study of science classroom environments in Taiwan and Australia. Specifically, it focuses on the development and validation of a questionnaire to assess student perceptions of the teacher-students interaction behavior. The questionnaire contains five domains which are higher-order questioning behavior, encouragement and praise behavior, non-verbal supportive behavior, understanding and friendly behavior, and strict behavior. The development process included the translation of the Chinese version into English, the back translation of the English version into Chinese again by people not involved in the original translation, and subsequent changes to the wording where necessary. Following the translation, pilot study were conducted in both countries. During the pilot studies, interviews were conducted with students about their comprehension and interpretation of individual items in the questionnaire. Refinements were made to the questionnaire based on statistical analyses and the interviews. Administration of the questionnaire to a total of 100 grade 7-9 science classes from both Taiwan and Australia supported each scale's internal consistency reliability and validity.

Significance

Teachers makes a major contribution towards a positive social climate in science classes, particularly through their interaction or communication with students (Wubbels & Levy, 1993). The way in which a teacher interacts with students is not only a predictor of student achievement, but also is related to such factors as teacher job satisfaction and teacher burnout. Appropriate teacher-students interactions are important to prevent discipline problems and to foster professional development. Furthermore, research has indicated that positive interaction relationships between teachers and students promote students interest and outcomes in science (Wobbels & Levy, 1993).

Classroom interactions occurs rapidly in a classroom and teachers are usually not aware, or not able to describe or remember what happens in their interactions with students. For example, Brophy and Good (1974) interviewed teachers and confirmed that teachers usually were not aware how many questions they asked students and what kind feedback they provided. Unless we can help teachers identify their interactions in teaching, and make them aware of what happens in class, it is difficult to promote positive science classroom interactions.

The association between learning environment variables and student outcomes has provided a particular rationale and focus for the application of these learning environment instruments. In a meta-analysis which encompassed 823 classes in 8 subject areas and representing the perceptions of 17,805 students in 4 nations, Haertel, Walberg & Haertel (1981) found enhanced student achievement in classes which students felt had greater cohesiveness, satisfaction and goal direction and less disorganization and friction. Other literature reviews since then have supported the existence of associations between classroom environment variables and student outcomes

(Fraser, 1994) Furthermore, this past research reinforces the importance of teacher behavior in creating a classroom environment or atmosphere conducive for science learning. Student-teacher interactions have been shown to be an important aspect in creating these favorable environments and are particularly important in "constructivist" classroom, where emotion plays a more prominent role (e.g., Watts & Bentley, 1987).

Therefore, the purpose of this study was to establish a questionnaire which would allow us to study teacher-students interactions in a large number of science classes at the same time. In the longer term, we are hoping to develop a better understanding of the teacher-students interaction occurring in science classroom in both Taiwan and Australia.

Development of the Questionnaire

Recently, a team of researchers in the Netherlands by focused specifically on the interpersonal relationships between teachers and their students as assessed by the QTI (Wubbels, Creton & Hoomayers, 1992; Wubbels & Levy, 1993). The Dutch researchers (Wubbels, Creton & Holvast, 1988) investigated teacher behavior in a classroom from a systems perspective, adapting a theory on communications processes developed by Waltzlawick, Beavin and Jackson (1967). Within the systems perspective of communication, it is assumed that the behaviors of participants mutually influence each other. This behavior of the teacher is influenced by the behavior of the students and in turn influences the student behavior. Thus, a circular communication process develops which not only consists of behavior, but determines behavior as well. This 'systems approach assumes that one cannot to communicate' when in the presence of someone else. For examples, if teachers ignore students' questions because they do not hear them, then students might infer that the

teacher is too busy, that the teacher thinks that the students are too dull to understand, or that the teacher considers the questions impertinent.

Based on this systems approach, Wubbels (1993) developed the Questionnaire on Teacher Interaction (QTI). Wubbels (1993) used a 48-item version of the QTI with a sample of 792 students and 46 teachers in Australia and confirmed its reliability and validity. The scales and items of the QTI were examined as a source for our new questionnaire. As a second source of information previous work by one of the authors was used (She & Barrow, in press). This research involved the use of questioning and reinforcement in the teacher interactions with students. Past research studies have shown these two interactive behavior have had a considerable effect on students' achievement, for example the major works of Brophy and Good (1974) and Walberg (1994). Thus the scales and items of our new Teacher-Student Interaction (TSI) questionnaire were also based upon this previous work on classroom teacher-students interaction, particularly, the work of She (1997).

The result of this initial development was the Teacher-Student Interaction (TSI) instrument which assesses students' and teachers' perceptions of the following five important teacher-students interaction behaviors:

- (1). Higher-Order Questioning Behavior (HOQB) : the extent to which the teacher uses higher-order questions to promote students' learning ;
- (2). Encouragement and Praise Behavior (EPB): the extend to which the teacher praises and encourages students;
- (3). Non-Verbal Supportive Behavior (NVSB): the extent to which the teacher uses non-verbal communication to interact positively with his/her students;
- (4). Understanding and Friendly Behavior (UFB): the extent to which the teacher is understanding and friendly to the student when interacting; and

(5). Strict Behavior (SB): the extent to which the teacher is strict with the student.

Most of the items in the Higher-Order Questioning, Encouragement and Praise, and Non-Verbal Supportive scales were based upon the authors' teacher-students interaction classroom observation findings. However, the items in the Understanding and Friendly and Strict scale, were obtained from the Questionnaire on Teacher Interaction (QTI) (Wubbels; 1993).

The development process included the translation of the Chinese version into English, the back translation of the English version into Chinese again by people not involved in the original translation, and subsequent changes to the wording where necessary.

Following the development of the questionnaire, validation data were collected from a pilot study conducted in Taiwan and Australia. These data consisted of students responses to the items of the questionnaire and comments which were obtained from student and teacher interviews and classroom observations.

After pilot study, a number of refinement were made to the items of the original questionnaire. Based upon item and scale analysis and interviews with students and teachers, the questionnaire was modified from 45 items to 41 items. One item was deleted from the HOQB scale and one item was reworded; one item was deleted from the EPB scale; one item was deleted from the NVSB scale and three items were modified; and one item was deleted from the SB scale.

Validation

In order to determine each scale's internal consistency reliability and validity, and factor structure, the questionnaire was administered to 1878 students in 50 grade 7-9 science classes in Taiwan and 519 students in 27

grade 7-9 science classes Australia during November-December 1996.

Estimates of the internal consistency of the five scales of the TSI instrument were calculated using Cronbach's alpha coefficient and are shown in Table 1. The Alpha reliability for each scale of the TSI, using the individual student as the unit of statistical analysis, ranged from 0.63 to 0.91 for Taiwan and from 0.63 to 0.87 for Australia. These results indicate that the scales display a satisfactory level of internal consistency.

An examination of the scale means depicted in Table 1 indicates that the Taiwanese students perceived their teachers to be considerable stricter than the Australian students. The Taiwanese teachers also asked more higher order questions and gave more encouragement and praise to students.

Conclusions

One of this study's major contributions is that a new teacher-students interaction instrument was developed and validated specifically for the science classes teacher-student interaction. The scales in this instrument were found to display satisfactory internal consistency reliability. Further discriminant validity analysis and factorial analysis will be conducted in order to provide additional validation information. The development of teacher actual and preferred versions of the questionnaire will allow additional comparisons to be made. After the development and validation processes are complete, the instrument will be utilized to study science classes teacher-students interaction in both Taiwan and Australia.

Our TSI questionnaire (student version) will be available for teachers to use in order to be aware and understand how their students perceive their teacher-students interaction in their science class. Moreover, teacher actual and preferred versions of the TSI questionnaire will be able to be utilized by teachers to assist them to detect any differences between their students and

their own perceptions of their science classroom interactions. Consequently, teachers will be able to use this information to promote an atmosphere of positive interaction in their science classrooms and improve students learning.

TABLE 1. The Descriptive Statistics and Internal Consistency Reliability of Teacher-Student Interaction (TSI) Questionnaire for the Five Scales In the Taiwan and Australia

Scales	No. of Item	Scale Mean		Item Mean		Alpha Reliability	
		Taiwan	Australia	Taiwan	Australia	Taiwan	Australia
HOQB	8	26.49	25.71	3.31	3.21	0.66	0.78
EPB	8	25.88	25.48	3.23	3.19	0.84	0.80
NVSB	8	25.32	28.00	3.16	3.50	0.70	0.77
UFB	9	32.38	31.69	3.59	3.96	0.91	0.87
SB	8	26.84	16.94	3.35	2.82	0.63	0.63

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